CLAIMS

1. A plasma injector assembly for use in a munition having a central axis, the plasma injector assembly comprising:

a stub case for attachment to the munition along the central axis;

an anode positioned in the stub case; and

a cathode positioned in the stub case, wherein the anode and the cathode are located at opposite ends of a plasma creation region, wherein the plasma creation region is aligned along a planar depth that is substantially transverse to the central axis.

2. The plasma injector assembly of claim 1, and further comprising a conductive wire that interconnects the anode and the cathode.

3. The plasma injector assembly of claim 1, wherein the plasma injector has a tube with a first end and a second end, wherein the anode is placed in the first end, wherein the cathode is placed in the second end, and wherein the tube has at least one aperture formed therein such that a region inside the tube is in communication with a propellant in the munition.

4. The plasma injector assembly of claim 3, wherein the plasma injector substantially ignites the propellant within about 1-2 milliseconds.

5. The plasma injector assembly of claim 1, wherein the plasma injector assembly produces plasma that is substantially directed along the central axis.

6. A plasma injector assembly for use in a munition having a central axis, the plasma injector comprising:

a stub case for attachment to the munition along the central axis;

a tube having a first end and a second end, wherein the tube has a central bore extending therethrough, wherein the tube has at least one aperture that is operably connected to the central bore, and wherein the tube is mounted to the stub case in an orientation that is substantially transverse to the central axis;

an anode positioned proximate the first end;

a cathode positioned proximate the second end; and

a conductive wire extending through the central bore between the anode and the cathode and operably connecting the anode and the cathode.

7. The plasma injector assembly of claim 6, wherein the plasma injector substantially ignites the propellant within about 1-2 milliseconds.

8. The plasma injector assembly of claim 6, wherein the plasma injector assembly directs plasma into the munition in a direction that is substantially aligned with the central axis.

9. A plasma injector assembly for use in a munition having a central axis, the plasma injector assembly comprising a plasma creation region that is defined by an anode and a cathode, wherein plasma generated in the plasma creation region is directed substantially along a plasma axis that is aligned with the central axis.

10. The plasma injector assembly of claim 9, wherein the plasma axis is substantially parallel to and offset from the central axis.

11. The plasma injector assembly of claim 9, wherein the plasma is directed along a plurality of axes that are each substantially parallel to and offset from the central axis.

12. A munition comprising:

a stub case;

a casing attached to the stub case, wherein the stub case and the casing are oriented along a central axis;

a projectile attached to the casing opposite the stub case, wherein the stub case, casing and the projectile define a substantially enclosed region;

a propellant substantially filling the substantially enclosed region; and

a plasma injector mounted substantially within the stub case in communication with the propellant, wherein the plasma injector has an anode and a cathode that are aligned along a planar depth that is substantially transverse to the central axis.

13. The munition of claim 12, wherein the plasma injector extends into the munition less than 12 percent of a length of the munition.

14. The munition of claim 12, and further comprising a conductive wire that interconnects the anode and the cathode.

15. The munition of claim 12, wherein the plasma injector has a tube with a first end and a second end, wherein the anode is placed in the first end, wherein the cathode is placed in the second end, and wherein the tube has at least one aperture formed therein such that a region inside the tube is in communication with the propellant.

16. The munition of claim 12, and further comprising a filler material having a channel formed therein, wherein the channel is adapted to receive the anode and the cathode, and wherein the filler material has at least one aperture that extends through the filler material to the substantially enclosed region.

17. A munition comprising:

a stub case;

a casing attached to the stub case, wherein the stub case and the casing are oriented along a central axis;

a projectile attached to the casing opposite the stub case, wherein the stub case, casing and the projectile define a substantially enclosed region, wherein the projectile has a guide portion that extends into the substantially enclosed region for a length that is at least one-half a length of the substantially enclosed region along the central axis;

a propellant substantially filling the substantially enclosed region; and

a plasma injector mounted substantially within the stub case in communication with the propellant, wherein the plasma injector has an anode and a cathode.

18. The munition of claim 17, wherein the plasma injector extends into the munition less than 12 percent of a length of the munition.

19. The munition of claim 17, wherein the guide portion extends more than 80 percent into a length of the substantially enclosed region.

20. The munition of claim 17, wherein the anode and the cathode are aligned along a planar depth that is substantially transverse to the central axis.

21. The munition of claim 17, wherein the plasma injector has a tube with a first end and a second end, wherein the anode is placed in the first end, wherein the cathode is placed in the second end, and wherein the tube has at least one aperture formed therein such that a region inside the tube is in communication with the propellant.

22. A munition comprising:

a stub case;

a casing attached to the stub case, wherein the stub case and the casing are oriented along a central axis;

a projectile attached to the casing opposite the stub case, wherein the stub case, casing and the projectile define a substantially enclosed region;

a propellant substantially filling the substantially enclosed region; and

a plurality of plasma injectors mounted substantially within the stub case in communication with the propellant, wherein each of the plasma injectors in the plurality of plasma injectors has an anode and a cathode that are aligned along a planar depth that is substantially transverse to the central axis.

23. The munition of claim 22, wherein the plasma injectors in the plurality of plasma injectors are connected in series.

24. The munition of claim 22, wherein the plasma injectors in the plurality of plasma injectors are connected in parallel.

25. The munition of claim 22, and further comprising a conductive wire that interconnects the anode and the cathode.

26. The munition of claim 22, wherein each of the plasma injectors in the plurality of plasma injectors has a tube with a first end and a second end, wherein the anode is placed in the first end, wherein the cathode is placed in the second end, and wherein the tube has at least one aperture formed therein such that a region inside the tube is in communication with the propellant.

27. The munition of claim 22, and further comprising a filler material having a channel formed therein, wherein the channel is adapted to receive the anode and the cathode, and wherein the filler material has at least one aperture that extends through the filler material to the substantially enclosed region.

28. The munition of claim 27, and further comprising placing an intermediate electrode between the anode and the cathode.

29. A method of launching a munition, the method comprising:

providing a munition having a propellant and a projectile, wherein the munition has a central axis;

providing a plasma injector igniter having an anode and a cathode that are oriented along a planar depth that is substantially transverse to the central axis;

passing current from the anode to the cathode to generate plasma; and

igniting the propellant with the plasma.

30. The method of claim 29, wherein the plasma injector extends into the munition less than 12 percent of a length of the munition.

31. The method of claim 29, and further comprising providing a tube and mounting the anode and the cathode at opposite ends of the tube.

32. The method of claim 31, and further comprising forming at least one aperture in the tube.

33. The method of claim 29, wherein the munition further comprises a stub case and a casing, wherein the casing is attached to the projectile, wherein the stub case is operably attached to the casing opposite the projectile, and wherein the stub case, the casing and

the projectile define a substantially enclosed region that is substantially filled with the propellant.

34. The method of claim 29, and further comprising operably connecting the anode and the cathode with a conductive wire.

35. The method of claim 29, wherein ignition of the propellant causes the projectile to be propelled away from the plasma injector.

36. The method of claim 29, wherein the plasma injector ignites the propellant in a substantially uniform manner.

37. The method of claim 29, wherein the plasma injector substantially ignites the propellant within about 1-2 milliseconds.

38. A method of launching a munition, the method comprising:

providing a munition having a casing and a stub case which define a substantially enclosed region that has an opening opposite the stub case;

inserting a projectile into the substantially enclosed region through the opening so that a guide portion of the projectile extends more than 50 percent of a distance from the opening to the stub case;

mounting a plasma injector igniter at least partially in the stub case, wherein the plasma injector igniter has an anode and a cathode;

passing current from the anode to the cathode to generate plasma; and

igniting the propellant with the plasma.

39. The method of claim 38, wherein the plasma injector extends into the munition less than 12 percent of a length of the munition.

40. The method of claim 38, and further comprising operably connecting the anode and the cathode with a conductive wire.

41. The method of claim 38, wherein ignition of the propellant causes the projectile to be propelled away from the plasma injector.

42. The method of claim 38, wherein the plasma injector ignites the propellant in a substantially uniform manner.

43. The method of claim 38, wherein the plasma injector substantially ignites the propellant within about 1-2 milliseconds.